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VOL. II.—No VII.

TORONTO, CANADA, JULY, 1889.

{ PRICE 20 CENTS
\$2.00 PER YEAR.

—THE—
Canadian Architect and Builder,
A JOURNAL OF MODERN CONSTRUCTIVE METHODS,

PUBLISHED MONTHLY IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS,
DECORATORS, BUILDERS, CONTRACTORS, AND MANU-
FACTURERS OF AND DEALERS IN BUILDING
MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,
14 King Street West, - TORONTO, CANADA.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for \$2.00 per year. The price to subscribers in foreign countries, is \$2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, it will be continued until instructions to discontinue are received and all arrearages are paid.

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ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The Ontario Association of Architects has appointed the "Canadian Architect and Builder" its official paper.

NOTICE OF REMOVAL.

The CANADIAN ARCHITECT AND BUILDER has removed to new offices at No. 14 King Street West, where subscribers and friends of the paper will always receive a hearty welcome.

PRESIDENT S. E. Dawson, of the Council of Arts and Manufactures of the Province of Quebec, expresses wonder at the slight notice which the work of the Council has excited from the press and people of Montreal. There are in Montreal alone 570 students pursuing a course of technical training, and in the schools throughout the Province last year the number of such students was 1346.

IT is said that in the department of the Paris Exhibition designed to illustrate the dwellings of mankind from the earliest times to the present, Canada is represented by an Indian wigwam. We concur in the hope expressed by the *Toronto Mail*, that the Parisians will not misunderstand the wigwam, and attribute to us a simplicity of architectural style to which we really do not aspire.

AS we have more than once endeavored to show, where a town decides upon having a system of water works, the municipality should assume the ownership and control, in preference to handing the same over to a private company, as has been done in too many instances. A despatch from one of our leading Canadian towns, will serve to show where the advantage lies as between the two systems. It states that "The surplus

in the water works department for 1888 is nearly \$9,000. This means a reduction of the rates to fully one-half of what they were under private ownership."

IT is difficult to understand the reasons actuating the City Council of Toronto in refusing to allow the Consumers' Gas Co. to compete with other companies for the privilege of lighting the streets by electricity. The Gas Company should be in an advantageous position to supply cheap electric light. Furthermore, in return for the privilege of wiring the streets of the city, it has offered to reduce the price of gas to the citizens to an extent aggregating \$50,000 a year. The Council should be interested in securing light for the citizens at the cheapest possible rate, and no hindrance should be placed in the way of a responsible company which offers to supply this requirement.

THE Scripps League of Western newspapers have chartered the steamer City of Rome for the purpose of sending a delegation of American artisans to the Paris Exhibition. *En route* the party will visit Liverpool, Birmingham, Manchester, Sheffield, London, and other great manufacturing points in England; Glasgow and the shipbuilding industries of the Clyde in Scotland; Rouen, Paris, and the great lace and silk centres of France; Essen, Dusseldorf, Antwerp and other leading iron and industrial centres of Germany and Belgium. The central point, however, will be Paris and the facilities which the World's Exposition will afford for observation of mechanical arts in all branches. The delegation will start from New York on the 24th inst. This enterprise has been received with much favor by all interested in the improvement of the artisan on this continent.

UNDER the law prohibiting United States contractors from employing alien labor, a number of Brockville stonemasons have been discharged at Ogdensburg. The Dominion Government will be asked to rescind the privileges enjoyed by American workmen employed in Canada which are not accorded to Canadian workmen employed in the United States. We are not in favor of measures so restrictive as the United States law in question, but considering our geographical situation and the treatment which has been accorded us, the Canadian Government would be justified in adopting similar measures towards the United States. Should it decide upon doing so, we trust the legislation adopted for the purpose will apply to professional as well as unprofessional workmen, and that the motto will be "Canada for the Canadians."

IT should be a cause of gratification to every Canadian to learn that the contracts for the large conduit pipe across Toronto Bay, as well as for the construction of the new pumping engines required in connection with the extension of the city water-works system, have been awarded to Canadian manufacturers. This circumstance should serve to enlighten those whose opinion has been that none but pipe of small capacity could be produced in quantity in Canadian workshops. One of the objections raised to giving the present contract to the Peter-

borough firm, was that their capacity was too limited to allow them to turn out the pipe at a speed approaching that of the Scotch foundries. There was perhaps some ground for this objection, but we are informed that it is the intention of the Peterborough company to immediately add to their buildings and machinery to an extent which will enable them to fulfil the requirements.

WE have it on most excellent authority that an American architect to whom has been entrusted the erection of a number of important buildings in Canada, recently made the statement that he would long ago have opened an office in Toronto but for the belief that his practice in Canada would fall off in consequence. In other words he understands the preference which many people in Canada are ever ready to accord foreign productions, and their belief that nothing excellent can result from the efforts of our own people. The architect in question deserves to be complimented upon his sagacity. With shame it must be confessed that he has correctly gauged the sentiment actuating many of our people. If these people would throw aside prejudice and travel sufficiently to be able to make fair comparisons between home and foreign work, they would not be long in finding out that Canadians can compete with foreigners in almost all lines of production. We have reached the stage in our history where we should rid ourselves of our provincialism, and manifest to the world our belief that we are just as good as our neighbors.

THE citizens of Toronto are being asked to contribute to a "children's fresh air fund," the ultimate object of which is to secure for poor children, especially those in delicate health, a residence of two weeks in the country. In the meantime, and until this object can be fully attained, the children will be given an occasional day's outing. Too much cannot be said in commendation of the service which the philanthropic citizens who have undertaken this project, are seeking to perform in behalf of unfortunate humanity. Without intending to throw cold water upon their efforts, we nevertheless feel it to be our duty to point out that two weeks residence in the country will do little to offset the effects of fifty-two weeks of every year spent in violation of all sanitary laws. Permanent improvement of the physical condition of the poorest classes, can only be brought about by improving the sanitary condition of the buildings they live in, and teaching, and if need be compelling, them to comply in some measure with sanitary laws. This is a matter for the municipal authorities to deal with, and we are free to confess, its solution will be attended with many difficulties.

WE had something to say quite recently on the importance to the contractor of knowing how to estimate. We referred to cases in which the bids sent in for work varied as much as fifty per cent. We learn that this condition of affairs is not confined to Canada. A writer in one of our American exchanges gives the following startling example of the lack of knowledge and recklessness which characterize the bids of many contractors: "A friend who is interested in such matters, who was recently in Nashville (the capital of Tennessee), had occasion to examine some of the bids made for certain public works there. From the extent and character of these works, there were included among the bidders some of the best contracting firms and builders of the whole country. I selected a few from each to show the run of them. These bids were all made on plans and specifications most explicitly and carefully prepared. The island filter: among the bids were \$22,190, \$29,300, \$42,709. The foundation of the pumping works: among others were \$67,280, \$73,525, \$107,670. Bridge piers, \$76,720, \$85,859, \$133,907, \$170,573. Bridge superstructure, \$64,433, \$75,000, \$91,000. For the thirty six-inch water main from the pumping works to the reservoir, \$20,400, \$33,315, \$19,000, \$55,960. For the reservoir, \$330,921, \$351,000, \$400,000, \$435,954, \$603,887. In one of these bids the secretary of the board discovered an error, in carrying out and footing, of \$153,000. It will be seen that in some of these the difference between the highest and lowest bid was more than the lowest bid." We

need look no farther to find the cause of so many failures among contractors. We trust the series of articles entitled, "How to Estimate," which we are now publishing, will be carefully read by Canadian contractors, and will assist them to the adoption of better methods of calculation.

ON the important question of the appointment of a paid Commission to superintend the construction of the new Toronto Municipal Buildings, barely one thousand ratepayers of the city took the trouble to record their votes. Of this number 638 voted against the appointment of a Commission. We cannot do other than regret this decision, which leaves the superintendence of the construction of the buildings in the hands of a committee of aldermen, the *personnel* of which will be subject to yearly change, and the members of which, with one or two exceptions perhaps, will be without the necessary experience to qualify them for their duties. Supposing that every member of the committee should honestly endeavor to serve the city's interests, it would nevertheless be too much to expect that a work of such magnitude will be carried to completion under the direction of the committee without the occurrence of some costly mistakes or impositions. We can only hope that this opinion may prove not to be well founded, and that both the citizens who voted to defeat the appointment of a Commission, as well as those who by their neglect to vote contributed to that result, may have no cause for future repentance. The application of some citizens for an injunction to restrain the Council from proceeding with the erection of the buildings without appointing a Commission, has been refused by the Court, on the ground that the Act of the Legislature merely gave the Council power to appoint a Commission, without making the appointment compulsory. With regard to the intention of the Council to appoint a Commission, as plainly expressed in the pamphlet issued for the information of the ratepayers when asked to vote \$600,000 to complete the undertaking, the Court held that the Council were at liberty to revoke or disclaim that intention. The learned Judge in expressing this view, took occasion to put on record his opinion of the conduct of the Council in thus repudiating the promise made to their constituents. This he did in the following words: "In deciding whether or not an injunction should issue, I have nothing to do with the propriety of the course adopted by the Council in repudiating a representation apparently put forward by their authority, and which was well calculated to mislead persons who thought a Commission desirable into believing that the Council would appoint one. In disposing of the costs, however, I am at liberty to say that the conduct of the Council appears to me to have been so discreditable that their costs ought to be refused."

WE have pointed out elsewhere in this paper that any permanent improvement in the physical condition of the poorest classes in our cities, can only be effected by improving the sanitary surroundings in which they exist. We are pleased to notice that a first step in this direction has just been taken by the municipal authorities of the city of Toronto, by the recommendation of an ordinance, which provides that "No dwelling house or other building occupied or intended to be occupied for human habitation shall hereafter be erected on any street, avenue, lane, alley, place, thoroughfare or public communication in the city of Toronto which is less than 40 feet in width. No dwelling house or other building occupied or intended to be occupied for human habitation shall be erected or used upon any land having a less area than 1,200 square feet. Every dwelling house or other erection occupied as a dwelling house shall have attached thereto as the yard or curtilage thereof a vacant space having an area of not less than 500 square feet, on which no building of any kind shall ever be erected or maintained." The foregoing sections are not to apply in any case in which the City Engineer and City Commissioner shall report in writing, and three fourths of the members of the said Council present at any meeting thereof shall vote that, in their opinion, the opening or acceptance of the particular thoroughfare or the erection of the particular building is in the public

interest, notwithstanding that the same is a contravention of this by-law.

Provision is made for the punishment of persons guilty of infractions of the by-law. The extreme penalty is \$50 fine. The convicting magistrate has power to order the offender to remove or pull down the building or erection which has been put up in violation of the by-law. If the defendant fails to remove the building by the time ordered by the magistrate it shall be lawful for the City Engineer, City Commissioner or any other person authorized by the City Council to pull it down at the expense of the owner.

This ordinance is very good so far as it goes, but it is, as we have said, but a first step. A sanitary regulation of this kind should go farther than defining the narrowest limits within which dwellings may be crowded together. To be effective, it must seek to regulate the interior arrangement and construction of the cheaper class of dwellings to an extent that will insure as far as possible the health of their inmates.

THE 17th annual exhibition by the Ontario Society of Artists, which was held in the Canadian Institute in Toronto recently, was successful beyond the expectation of the members, a very large number having viewed the pictures exhibited. There was also many more pictures sold than at any of the previous exhibitions.

We do not profess to criticize the pictures, preferring to leave that to more able hands. We may say that there were some good works, showing that our artists are capable of great things if encouraged; many that were worthy of commendation, and a few that should not have been there at all.

We can see no reason why a hanging committee should not use some judgment in the selection of pictures. It must be understood that those persons who are capable of judging as between a good and bad picture will wonder why the poor pictures were hung, while those unable to distinguish the good from the bad, will be puzzled as to what is good and what is bad artistically. The weeding out of the bad would benefit the public, but not nearly to the same extent that it would the artists themselves. There is no inducement for a good man to exhibit where he is likely to be placed as on an equal standing with a very poor man, or one only beginning to win a position. Make it more difficult to gain the admittance of a picture to an exhibition, and the more highly will the privilege be valued. But the strongest argument for the adoption of such a rule is, that the public should not see at any exhibition of the Ontario Art Society, pictures of ordinary or doubtful merit. The object of holding the exhibition should be to educate the public in art, and that cannot be done by placing before them for their admiration pictures of doubtful merit, or possibly none at all. The fear of offending a brother artist should not weigh when the interests of the Society and the public are at stake. The hanging committee could be selected from among those men who exhibit but few pictures, but who are nevertheless capable of judging the qualities of a picture, and who would not hesitate to weed out the bad.

There is another matter on which we would like to make a few remarks, and that is the values placed on the pictures. Every man has the right to place his own value on his work, and we do not see that anything like corresponding values can be placed on the pictures. There is no doubt but that as matters stand the values placed on some works are very much higher than those placed on others of greater excellence. This is not, however, our principal cause of complaint, but rather that values are placed on pictures which nearly every man in the room knows is a "fancy" one. There are but few pictures which cannot be had at a very liberal discount by those who choose to adopt the not very enviable position of beating down the artist, or if it cannot be had, then one can be assured that in a few days or weeks it will be offered at much lower figures, or

very possibly go down under the hammer of the auctioneer. We should like to see the artists mark their pictures at the very lowest figure they will take for them, and refuse to come down even one cent. The confidence of the public would thereby be gained, and they would not, as they now do, refuse to buy for fear they may find out later on that they paid more for a picture than they need have done.

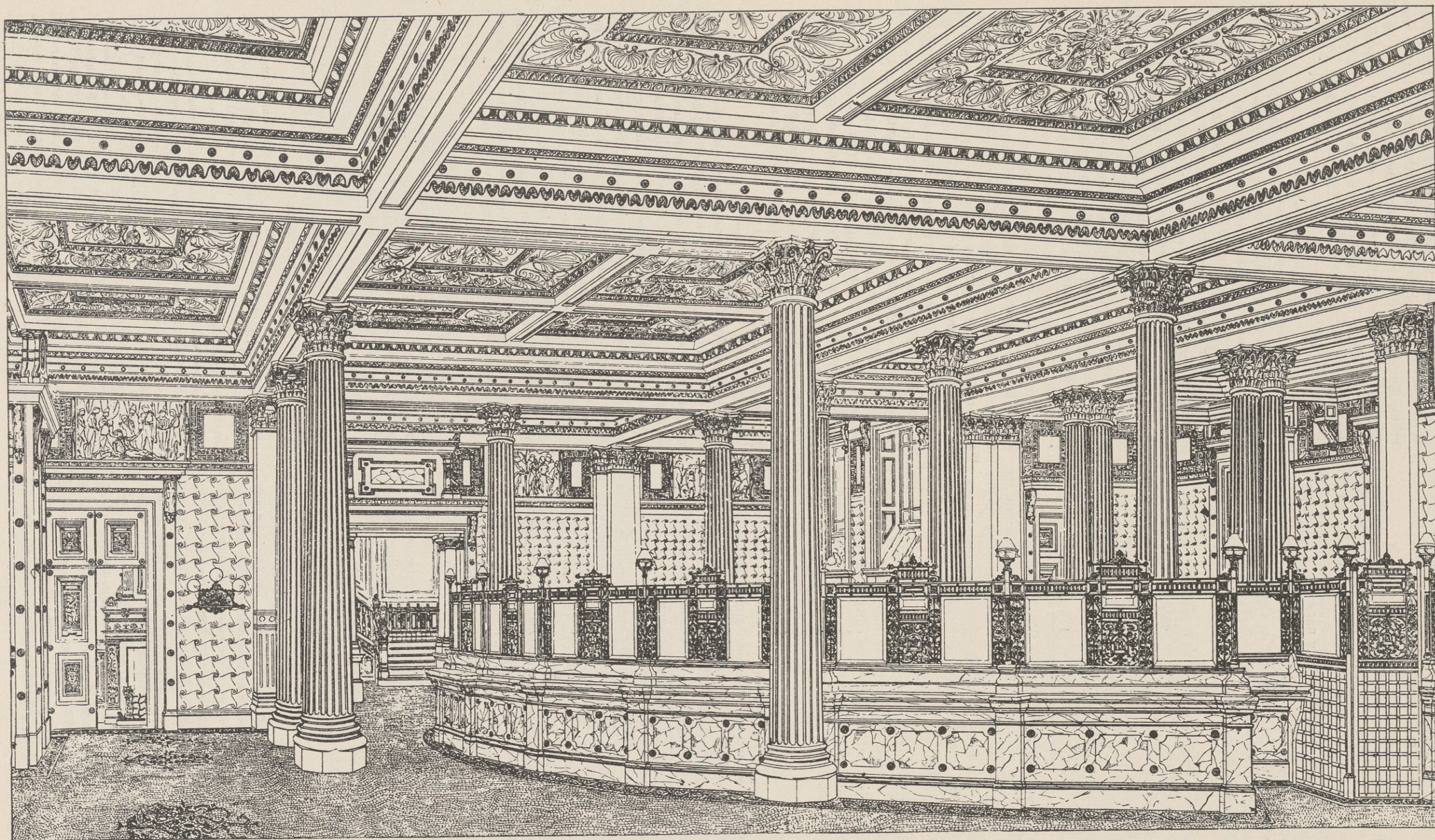
If the public were assured that all the pictures on the walls at an exhibition of the Society were good, and valued in the catalogue at something like their proper artistic value, they would not hesitate to buy as they now do. We have not the slightest doubt but that there are very many persons who would buy pictures of our artists if they were assured, first, that they were getting a good picture, and secondly, that they were not paying more than it was worth. A man who knows a good picture from a bad one will not hesitate to buy when he sees a favorable opportunity, but the man who has no confidence in his judgment as to the merits of a picture, will hesitate, and if he has any common sense, will refuse to buy as matters now stand.

The Society does not seem to care what the sketches are like which they allow the subscriber to select from. At the last exhibition there were a number of good sketches, but we may safely say that there were very few in the portfolio on the last day. That such was the case, reflects much credit on the subscribers. They seem to have been able to select the sketches having the highest merit and leave the rubbish. Now we think that all sketches from which subscribers are allowed to select should be good, and who should be better judges as between the good and the bad than the Society? The Society should not hesitate to throw out all inferior sketches for fear they may be charged with favoritism or jealousy. By accepting poor sketches, and allowing them to be palmed off on their subscribers, the Society is doing a wrong to those who are supporting it, and also to itself.

All artists believe that the public requires to be educated in art. We should like to enquire how that is to be done by allowing them to take to their homes wretched water color drawings. The artist may say that they get value for what they pay for—for what can they expect to get for \$5.00? But such is not correct. A bad water color is worth nothing, and the subscriber has given \$5.00 for it. Where does he get his value? No! the Society should see that no subscriber can by any possible means get less than value for his money. Suppose he receive more than value, as many do, no harm results, but the opposite. A good picture is sent out to exert an influence for good upon the tastes of the people for art, and to induce them to buy better and more expensive ones in the future.

Harm to art can only result from allowing poor, or worse than poor pictures, to go into the homes of our people under the auspices of a Society of Artists. If artists do not wish to paint good pictures for the Art Unions, then for the good of art in this country, the Ontario Society of Artists should not allow them the privilege of painting bad ones. We are sanguine that if the artists will do credit to themselves and paint the best pictures of which they are capable, it will result in benefit to themselves both in reputation and remuneration.

We are of the opinion that no pictures should be hung at the exhibition which are in the hands of parties other than the representatives of the Society, for disposal. It is not seemly that anything approaching a regular sale of pictures should be allowed at an exhibition. The value of the pictures are in the catalogues, and they should be sold at those figures or not at all. It is a bad policy to allow the purchaser to believe that he can obtain a picture at a lower rate by making offers which very often bear no relation to the value of the picture. Agents should therefore not be allowed to urge upon a prospective purchaser of a picture those in which they are interested, nor to lower prices to induce a man to buy a picture he would not otherwise buy, to the loss of an artist who does not desire to adopt similar methods.



INTERIOR OF BANK OF MONTREAL, MONTREAL.—MESSRS. TAYLOR, GORDON & BOUSFIELD, ARCHITECTS, MONTREAL.

OUR ILLUSTRATIONS.

CHURCH OF ST. MATTHEW, FIRST AVENUE, TORONTO.—
STRICKLAND & SYMONS, ARCHITECTS, TORONTO.

THE church on plan consists of a nave 70' x 35', with a wide aisle to the north separated from the nave by an arcade carried on massive pillars of Portage Entry stone. The chancel at the east end occupies the full width of nave, being separated from it by a handsome oak rood screen, which also separates the organ chamber from the church. The chancel, extending farther east, forms the sanctuary, which is in immediate connection with the clergy vestry and choir vestries, etc. The interior of the church will be finished in stucco work, the window and door trimmings and dados being of brick. The nave is amply lighted by five pairs of large windows to the south, and clerestory windows over the nave arcade to the north. It is the intention of the congregation to place a fine memorial glass in the east window of the chancel. The side walls of the nave are 30 ft. high to the cornice, and 50 ft. to the apex of roof. The roof over nave and aisle will be in elaborate open timber work, finished in natural pine. The nave roof extends over chancel, but being much more elaborated over that portion than over nave. The sanctuary is finished in pressed brick, sedilia and piscina in Portage Entry stone, showing on the south side; the walls and ceilings of the sanctuary above the brickwork will be elaborately decorated in color and bronze. On exterior, the church will be finished with red Credit Valley stone to the height of the window-sills, and above that in red brick relieved with stone trimmings. The design permits of a tower and spire being erected on the north-west corner, and it is hoped soon to have the funds necessary for its completion. The tower over the vestry is to receive the set of chimes for the present. The church will be heated and ventilated on the best system, and the entire chancel fittings and seating of nave are to be in hardwood. The building is at present above ground line, and it is hoped that the roof will be on before fall.

A rectory will be erected immediately in connection with the church at a cost of about \$5,000.

INTERIOR OF BANK OF MONTREAL, MONTREAL.—MESSRS.
TAYLOR, GORDON & BOUSFIELD, ARCHITECTS, MONTREAL.

REPOSE IN ARCHITECTURE.

TOO much of the architecture of to-day lacks the element which is most conducive to dignity—repose, writes Mr. E. H. Brown in the *Builder and Decorator*. Our buildings are like ourselves, full of a nervous, restless energy; quaint, picturesque, striking perhaps, but rarely restful. We are too fond of producing feats of architectural gymnastics, buildings, which cause us to stop, look and wonder, but as we see them day after day we soon grow tired of them and long for something different, we know not what, something different is all we ask for. We are astonished and startled by what we see around us, but the work of our architects is too much like the sensational novel of the day turned to stone.

On the banks of the Danube, six miles away from the old town of Ratisbon, stands a building erected by King Louis of Bavaria to commemorate the illustrious dead of Germany. Built upon a massive granite base, up which winds a broad staircase, is an exquisite Greek Doric temple of pure white marble. The hill side is covered with forest trees, in the midst of which the granite walls stand out prominently, while the Walhalla itself is seen clear cut against the distant sky. As we gaze upon it we are almost awe-struck with the sublime beauty and majesty of the building, dominating the landscape as it does with a calm serenity, contrasting strangely with the rushing torrent of the mighty river at the foot of the hill. None of the great Gothic cathedrals, with their sky towering vaults and uplifted spires, can produce the same feeling of sublimity, for none of them exhibit the same majestic repose. Durham Cathedral alone approaches the Walhalla in grandeur, but Durham is not a Gothic building. It too, in the massiveness of its Norman architecture, its great square towers, and time-worn walls, looks down upon us from the cliffs of Durham as if it were some mighty giant who had laid himself down to rest, conscious of his mighty grandeur.

As we walk up Corinthian-avenue in this good city of ours, and see before us the exquisite façade of Girard College, we cannot help feeling the fascination which its quiet majesty exerts upon us. There is no wonder excited within our minds as to what holds the building up amidst the thrust and counter-thrust of innumerable arches, pinnacles, and buttresses. There is no startling combination of colors or materials which flashes upon and dazzles our sight as the blare of trumpets deafens our ears. Instead there are vast columns, carrying the simple downward thrust of the weight above them. We can see, without puzzling ourselves, that the building will stand because it cannot help it. The horizontal lines dominating the composition produce the effect of repose which gives the vast white marble building its peculiar majesty. People may smile as they choose at a three-storey building in the cella of a temple, but can they, when brought face to face with it, truthfully say they can view it without feeling impressed by its majestic beauty?

This element of repose is an essential one in all architectural compositions which make any pretence to being monumental in their character, but is rarely possible in combination with the picturesque. While this latter quality may not be out of place in the cottage or in the village street, it seems to be better suited to out of the way places than to the busy haunts of men. It has no place in the great warehouse, the office building or the business house. These should not be buildings which attract us, perchance, by their quaintness, their odd conceits, or the elaboration of their detail. We have no time in this busy work-a-day world of ours to stop in the midst of our toil for such things as these. They worry us with their oddities and their strange conceits. They are as much out of place as one of Ouida's novels would be in the counting house. Our business building should have quiet dignity, a simple massive grandeur that we will not grow tired of, that will by the very sight of them tend to rest us from the worry and turmoil of our struggle for bread. We should study the use of plain wall surfaces, of horizontal mouldings, of exquisite perfection of detail, rather than that of ornament piled on wherever there is space large enough to be carved, or arches of every conceivable shape, or of crowded gables turning themselves towards city streets in such profusion that the skyline resembles more the teeth of some huge demon saw, than the roofs of buildings for the use of sober men. Is it not possible for our restless American nature to curb its exuberance and learn to appreciate the value of repose in our architecture, even though we may never allow ourselves any rest in our struggle for the "Almighty Dollar?"

MEASURING BRICKWORK.

PROBABLY the best way to measure brickwork, in the opinion of an American writer, is by the dimensions. The unit of measurement in this case is not important. The cubic foot or yard is employed to some extent, but the perch of 25 cubic feet and the superficial rod in brickwork one brick thick, are often used. Unfortunately the term "rod" has no very definite significance. Two hundred and seventy-two and a half feet super, and one and a half bricks thick, 16½ feet square or 272½ square feet and one brick thick, 16½ square feet and 63 square feet, are all termed "rods." Under these circumstances it would probably be of advantage if the cubic foot or yard could be made the standard unit of measurement for brickwork throughout the country.

It may be added that the number of bricks contained in any piece of built brickwork may be approximately ascertained by deducting one-tenth for the volume of mortar.

The sand blast is now utilized for cleaning dingy stone walls of buildings.

Mr. Jas. Balfour, architect of the new Hamilton court house, has notified the Committee that it will not be possible to erect the building according to his design for the amount subscribed by the council, \$75,000.

A new process of hardening plaster so as to make it available for the construction of floors in place of wood, has been brought before the French Academy of Science by M. Julte. A mixture of six parts of plaster of good quality and one part of finely sifted, recently slacked white lime is employed like ordinary plaster. After it has become thoroughly dry, the object manufactured from it is saturated with a solution of any sulphate whatever whose base is precipitated in an insoluble form by lime. The sulphates especially recommended for the purpose are those of iron and zinc. In order to obtain the maximum of hardness and tenacity, it is necessary to temper the limed plaster well in as brief a space of time as possible, and with no more water than is strictly necessary.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

MONTREAL SEWERS—CONTRACT VS. DAY WORK.

NOTHING further has transpired since your last issue regarding the construction of sewers by contract or by day's work. The question has been once or twice brought before the Committee, and the Chairman of the Road Committee seems determined that he will yet succeed in having the sewers constructed by contract, rather than by his department under "day's work." Many owners of real estate are inclined to side with him on this point, while the majority of the Council still stick to having the work done by the road department themselves. In my opinion there is lots of work, such as street repairing, side walks, flag stones, crossings, gullies and general repairs, that would take all the attention of the Road Department, without meddling with the construction of such a simple matter as the sewers themselves. If the sewers cannot be constructed by contract, then no work can be constructed by this method. If there has been, as stated, any defective work constructed by contract for the city, the fault lies with the inspectors who are supposed to be daily on the work to see City Surveyor's instructions carried out. If the authorities, instead of wrangling over the construction of sewers by contract or day's work, would place the whole responsibility on the City Surveyor and give him *carte blanche* to employ competent inspectors at a fair remuneration, instead of compelling him to employ friends of the influential aldermen, who are generally broken down tavern keepers or friends of political wire pullers, better results might be expected. As long as this system exists, how can we expect to get good work done? Even the mechanics themselves will rebel against having their work inspected by men who are totally incompetent.

MOUNT ROYAL INCLINED RAILWAY.

The directors of the Mount Royal Inclined Railway Co., have decided to extend their lines down to Park Avenue at once, and have instructed Mr W. McLea Walbank to prepare the necessary plans and specifications and take tenders for carrying out the same.

Capt. Jas. Wright, Mechanical Engineer, is preparing the plans and specifications for the boilers and engines to create the motive power for the same.

The work will begin immediately, and it is expected that by the middle of August the cars will be running. There will be a double track 4 feet 8½ inches gauge, with the motive power at the upper end of the incline, which is about 1 in 12, and the cars will be drawn by steel wire cables, with a platform at or near the Golf Club House. The city has promised to grade and macadamize a carriage road to connect with the street railway, a distance of about 400 feet.

The passengers will have to change cars at the foot of the present incline. Owing to the great difference of altitude between the two railways, it would be impossible to run the same cars over the two lines. This, however, under the present circumstances is not an objection, as the present terminus will be a very convenient one for passengers coming by the way of University St., and the new platform will be used by those coming by Park Avenue.

The new railway carries twice as many passengers as the existing one, but takes twice as long to make the trip, therefore the upper road will be clear in time for the arrival of the second train. The present incline makes its trip in 45 seconds.

MONTREAL STREET RAILWAY.

Complaints are loud against the running of our street railways. The Council have at various times ordered a detective to watch them to see that they keep up to their time table, but through some unforeseen reason they have not been able to catch them. The tracks are also very much out of repair, and hardly a day passes without some vehicle coming to grief. One would hardly think that a town of the size of Montreal would put up with the tracks constructed such as ours are.

BOULEVARDS.

A petition has been sent in to the City Council by residents owning property on the east end of Mount Royal Park, offering to cede 20 feet of ground to the city, provided the city gives an additional 20 feet and makes a boulevard from St. Jean Baptiste St. to Mount Royal Avenue. The Council are likely to accept, provided the proprietors will agree to build all their houses facing the park, and promise not to build any stables or sheds on the boulevard.

THE BUILDING INSPECTOR.

The city of Montreal has a Building Inspector. It has also a by-law regarding the construction of buildings within the city limits. Either the Building Inspector does not attend to his duties or the by-law is very defective, for I notice that on St. James St., our principal thoroughfare, there is at present in course of erection an additional story to a building occupied by the Bishop Engraving Co. which would be a disgrace to the smallest village in the Dominion, to say nothing of the "commercial metropolis." I do not know if the Building Inspector's attention, as been drawn to it, or how he interprets the by-law, but according to my interpretation, "it is contrary to law to erect a wooden building without encasing it with brick." Even casing it with brick is bad enough, but when we see a fire trap, (such as this undoubtedly is) erected on a principal street, it is no wonder the citizens ask, "what is the use of Building Inspectors and by-laws if both are put at defiance?"

BUILDING NOTES.

There has been quite a noticeable improvement in the building trade during the past month. Contracts are open for the following buildings: The extension to the Merchants' Cotton Factory, two houses for Dr. Hings-ton on Sherbrooke St., a house for R. J. Tooke, Peel St., a cottage for N. White, Quibler St., a Methodist Church on St. Catherine St. west, and several buildings on St. Lawrence Main St., a house for H. Brodie on Dorchester St. west, a warehouse on St. Patrick St., for Messrs. A. W. Morris & Bro., the celebrated cordage, jute and binder twine manufacturers, consultation rooms and dwellings on St. Catherine St. for Dr. Buller, and block of houses on Bishop St. for Mr. Whitley, house for Peter Lyall on same street, house on Peel St. for Mr. E. F. Mosley, one adjoining same for W. McLea Walbank, architect.

Preparations have commenced for the widening of Baggage St., which will cause the demolition of several houses, and will doubtless tend to induce owners to build new and improved dwellings on the new line of street.

PENCILINGS.

The City Council have been unable to decide upon an assistant to Mr. B. D. McConnell, superintendent of the water works. The matter has been shelved for a time at least, by a resolution of the Council ordering the candidates to undergo an examination, but it is questionable, even if this is done, whether the Council would then accept the candidate recommended by the examiners. I understand that the Council have been pretty thoroughly canvassed and their votes promised to one or other of the ten candidates. It is really too bad that valuable time should be lost and the city suffer because the Council cannot agree among themselves upon a suitable official to assist the superintendent.

It is said the City Council will vote \$1,000,000 towards the prevention of floods.

The Warren Scarf Co. have commenced laying their patent asphalt on Notre Dame Street. It is to be hoped they will not crown it so much as James Street, thereby making it slippery for horses.

STRENGTH OF PLASTER.

THE extraordinary forces of adherence, etc., of the Paris plaster enables the work on ceilings or partitions to be executed with far less expense of lathing than similar works executed with our lime and hair. Rondelet made experiments to ascertain the limits of these forces, and he obtained the following results. A parallelepipedon of plaster, with a base measuring one inch each way, supported a weight of 765 lb., acting so as to tear it asunder. This he called the force of adhesion. Similar figures resisted a crushing weight of 722 lbs.; so that the ratio of the resistance of plaster to an effort of traction compared to one of extension is as 1 to 9½. Rondelet found that there was a sensible difference in the manner in which plaster adhered to brick or stone, from the action of mortar under similar circumstances. For when cubes joined by the respective materials were subjected to forces tending to tear them asunder, the mortar broke through the centre of the joint, leaving particles attached to the upper and under surfaces. Plaster, on the contrary, left the surfaces perfectly clean. In new works the plaster adheres to other materials with about half the force necessary to tear it asunder. Mortar, for several years at least, only attains one-third of the same force. This ratio does not continue, for after ten to twelve years the plaster loses its strength, while, at the same epoch, we find the adhesion of the mortar to other substances to be equal to the force of adhesion of the cubes themselves. The subsequent ratios are in inverse progression. Mortar always hardens by time; plaster loses its strength. As these remarks only apply to its use as a mortar externally, it should never be employed permanently for such positions. Internally the loss of strength is not so rapid, for it depends upon the absorption of moisture from the atmosphere. For temporary works, for internal works, requiring great rapidity of execution, however, the use of Paris plaster is invaluable.

The new cantilever bridge which is to be erected across the St. Lawrence at Quebec to connect the Intercolonial and Canadian Pacific Railway systems will be of gigantic dimensions. The width of the St. Lawrence from shore to shore at Quebec is about 4½ miles, and the total length of the bridge, with approaches, will be nearly 6½ miles. Two main piers are to be constructed of solid granite in forty feet of water, about 500 feet from each shore. These two piers are to support a cantilever of a span of 1,442 feet. The tops of the bridge from high-water mark will be 408 feet.

PERSONALS.

The estate of the late Wm. Davis, contractor, of Ottawa, is valued at \$767,000.

Mr. R. McLean Charlton, architect, of Toronto, has opened a branch office at West Toronto Junction.

Mr. S. G. Curry, of the firm of Darling & Curry, architects, Toronto, is holidaying in the health-giving clime of Muskoka.

Mr. W. M. Gartshore, Secretary of the McClary Manufacturing Company, London, has returned from a very successful business trip to the Pacific coast.

Mr. Edward Leonard, a well-known contractor, of St. Catharines, Ont., died very suddenly of heart disease in that city on the 7th inst. He was a member of the firm of Smyth, Leonard & Mumford.



ART INSTRUCTION IN ONTARIO.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—The work of the Ontario Art Schools was on exhibition during the first week in June. There were a very large number of drawings on the walls from the different schools throughout the Province. Many of the drawings showed considerable skill on the part of the students, but the bulk of the work would lead one to the opinion that there is no definite purpose in the art training given in these schools. I am informed that the sole purpose of the Minister of Education is to give a training in the technical arts that our industries might be benefited. The drawings at the Normal School, to a very large extent, were the work of young ladies who are anxious to paint pictures before they learn to draw. They wish to have as one of their accomplishments, the artistic one of painting. It matters little whether they can draw or not, so long as they can produce something which will be the admiration of some of their inartistic friends.

Many young ladies are taking a course in some one of these schools with the purpose of fitting themselves to give lessons in drawing and painting. It is therefore necessary that they should be properly and thoroughly trained, as they will exert a very large influence for the advancement or retardation of art in this country. They are not receiving that instruction in the art schools at present, nor will they until the management of the schools is placed in the hands of men who know what art is, and are capable of directing the schools so that they will be able to give the training which has been outlined for them. If the schools are only to give instruction in the technical arts, well and good, but have the training a correct and a thorough one. I should like to have schools teach art with no other purpose than to cultivate and refine the people, but if it cannot be done, I will not complain. But when neither one thing nor the other is being done, and valuable funds are being expended, we have every reason to find fault.

A reasonable amount of money expended in art training, be it technical, industrial, or what is sometimes called high art, under a competent and intelligent management, would be money well spent. But money spent in teaching nothing in particular under the name of art, is money worse than wasted. I should have liked to have seen the drawings which were sent in in competition for the medals placed together, and where one could see them. It is almost impossible to make any comparison between competitive drawings, when they are placed some distance apart. It may be that there are those who have no desire that the public should be afforded any opportunity to make comparisons. The drawings which competed for the gold medal should have been placed together, and in a good light. This was not done; they were distributed about the corridors under the gallery of the theatre where there was little or no light. I see that the decision of the judges was not acceptable to one at least of the competitors, who very spiritedly returned her certificate to the Minister of Education. I am inclined to believe that Miss Beatrice Lukes was advised correctly by her friends that she should have received the gold medal. The medal was to be given under definite conditions, which were not followed by those who decided the competition. But in any case, it is the opinion of those competent to judge, that Miss Lukes should have been awarded the medal under any and all circumstances. There are rumours that the judges did so decide, but that their decision did not meet with the approval of some one in authority, who deemed that it would be better that the interests of an individual should be sacrificed to the advantage that would result to art and a particular person by having the medal go to different parts of the country as might be found desirable. It is not pleasant to refer to such stories, but where there is apparently some foundation for them, they are better referred to. There is one point on which I have an opinion, and that a very definite one, and it is, that none but the

most capable men should be appointed as judges in the awarding of places to the students of the art schools. There were more than one of the judges in this last competition who were totally unfit for their work. Competent judges are not hard to obtain, but it may be that when competent they are not so tractable nor so likely to overlook the faults of the art school system as those who are not very well posted in the matters on which they are supposed to give a decision.

Dr. White, the president, does not seem to be altogether satisfied with the position of the school. He complains that the attendance should be at least 8 or 10 times greater. I do not hesitate to say that I am very thankful the attendance is no greater, for there are now far too many receiving instruction in art (?) which they would be very much better without. He is also inclined to affirm that the Art Societies of this city are indifferent to art. I am inclined to agree with him to some extent, but do not think they are to be censured for holding themselves aloof from his school. The fact of the matter is, their assistance was not wanted except to supply funds, and to give a standing to the school which Dr. White is evidently aware it does not possess. There was no intention to give them any control of the school, nor even to allow them to render assistance or intelligent advice. When the directors are really desirous of having the assistance of the Art Societies of this city, they will find them only too ready to give any assistance in their power. But they do not propose to enter into a contest with ignorance for supremacy in the teaching of art with Government funds. The moment that their advice was opposed to the authorities, that moment would they have to go, as they have had to go before.

The Art Societies of the city should combine and undertake the support of a first-class art school. The Royal Canadian Academy should do something towards educating the people of this city in art, if it desires to secure the support of the public in the erection of its proposed new building. Talk on the beauties and advantages of art is not of much account. Work will effect very much more. What has the Academy done to aid the young men of this city towards gaining any instruction in art? None whatever. And there are those who are deserving of such aid. The members of the Art League of Toronto should receive encouragement and aid in their efforts to study art, for they have not united for assistance, but have gone to work like men to aid themselves, and are reaping their reward.

I should like to know what value the certificates of the Minister of Education possess. They seem to be distributed with a most liberal hand, so liberal in fact, that one is inclined to place their value below the cost of printing. I should like to know why it should be considered necessary to give a scholar at an art school a certificate that he has attended such school. Scholars at our public schools are not thus provided with certificates of attendance. Before we know where we are, we will have the country peopled by certificated artists from the Ontario Art Schools, which would be very nearly as great an infliction as the French language in the public schools. Certificates should only be given for proficiency in the different branches of the course, and should mean something. As it is, they mean nothing, and are of no value whatever except to cause a person to distrust the possessors knowledge of the subject set forth in the certificate.

ANTI-HUMBUG.

If paint refuses to stick to new tin or other metal, sandpaper the metal.

Metallic or iron oxide paint is the best article for tin roof. Apply directly upon the new tin.

Gum animi, 2 ozs., in a half pound of linseed oil, is suggested as a good liquid to be used with bronze powder; the gum to be gradually added to heated oil; then boil, strain, and dilute with turpentine.

To make a good paint for shingle roofs that can be applied cold and dries quickly: Take one barrel of coal tar, ten pounds of asphaltum, ten pounds of ground slate; mix by the aid of heat and add two gallons of dead oil.

SANITATION NEAR HOME

IS IT ADVISABLE TO RESORT TO THE USE OF WROUGHT IRON PIPE AND FITTINGS? *

IN view of the fact that the sanitary regulations of municipal bodies are requiring the cast iron soil, waste and ventilation pipes to be air tight, is it advisable to resort to the use of wrought iron pipe and fittings?

What is the necessity for substituting wrought iron for cast iron pipe for soil, waste and ventilating purposes in order to make same air and water tight? There is no doubt but wrought iron pipe can be put together perfectly tight, so also can cast iron pipe. It is being done successfully every day. Joints made with lead and oakum will not be tight, however, unless pains are taken in packing the oakum sufficiently to calk the lead against, without driving more or less of it into the pipe, thereby having nothing against which to pack the lead, and the use of lead free from solder, nor will a screwed joint be tight unless the threads are perfect and tightly screwed together. This joint, however, has the advantage over lead in the fact that it will soon rust tight, and the longer it stands the tighter it becomes. A lead joint in cast iron pipe is liable to become loosened from the following causes: unequal expansion and contraction, settlement of walls, floors and beams, from which pipes are often hung and dependent for support. To what extent such settlement affects cast iron soil and waste pipe well constructed to begin with, I cannot say, but offer it as my opinion that to all intents and purposes it is unaffected by such settlements as usually occur in a building before the same is condemned and abandoned, when the cast or any other soil pipe would naturally share the same fate, so the real condition being of no importance so far as further use is concerned.

Wrought iron pipe is very elastic and will yield to strain without injury more readily than cast iron pipe: but this is of no special importance in this particular case, as we do not construct soil-pipe to support buildings nor keep floors from settling, nor would it do it if we did, therefore cast iron pipe is as good as wrought, so far as trouble from settlement is concerned, according to my judgment.

The weakest part of using wrought iron pipe with threaded joints for house drainage purposes, is the impossibility or impracticability, of protecting that part of the screw-head that will not go into the fitting, leaving $\frac{1}{2}$ -inch or more of unprotected pipe threads cut nearly in two by the action of the dies in cutting the threads, the threads being $\frac{1}{8}$ -inch deep, the pipe not more than 5-16 thick. You can readily see its weakness here. Cast iron pipe is also weak here, although in a different manner. When you cut a pipe you have no spigot left except on the end you do not wish to use, for the want of which it becomes very difficult to make a tight and satisfactory joint. The liability of shoving oakum through the space between the ends of the pipe and the shoulder of fitting into the pipe, and the pipe pulling apart, is a serious objection to a joint without a sprigot end, which should and could be remedied.

It is well known to practical plumbers that it is not a difficult matter to make tight joints with lead and oakum; but it is equally well known to the writer of this paper that a large proportion of our best workmen do not give this department of the plumber's trade the attention its importance demands, but are so anxious to polish up and overcast joints that catch the eye, that the matter of perfectly tight soil and waste pipe is not considered at all. This, however, is not the fault of cast pipe, lead or oakum, but is another illustration of how a plumber will put in three times the amount of time necessary to make good work, either doing nothing, or making the helper give the joints a few ineffectual taps with a calking chisel, or half doing the work himself, thereby bringing this excellent joint and pipe for drainage work into disrepute, and justly so if they do not make this

joint all it is capable of receiving at their hands, for it is a fact that I never yet have seen a soil-pipe put up without reference to a water test, that did not leak in a majority of joints when the same become stopped, thereby putting a pressure of water on the stack. There are no places or conditions under which a perfectly tight and satisfactory job cannot be constructed with cast iron pipe and lead joints, if the plumber doing the work will only spend one-half the time doing it that he does fooling around, scrubbing up parts of the work that are not only unnecessary and uncalled for, not wanted or paid for by anybody else than the man least able to afford such extravagance, the master plumber; for it is a fact that nine-tenths of the people employing plumbers, either by day or contract, do not intend to pay for fancy work at fancy prices. They understand the importance, in a financial sense, of having two-thirds of the plumbers in their city or town estimate, and thereby getting the closest possible figures and giving the work to their favorite, providing he will cut the figures still a little lower to insure a good job and their lasting friendship.

But we were speaking about conditions for doing good work. I must say that wrought iron pipe is much more difficult to handle than cast when large sizes are required, unless buildings are especially constructed for its size. It is quite a difficult matter to revolve large size fittings between joists set as they usually are, 16, 14 and 12 inches apart from centre to centre. Again, when soil pipes come in brick walls in chases left by the bricklayers 4 by 8, at the commencement of same, and, as frequently happens, 4 by 3 at finish, or worse, covered after second story is reached and entirely abandoned. In addition to this, the trimmers around chimney breast on opposite sides of walls even, often make it necessary to do so much cutting away of mason work in order to turn the fittings into proper position, that does not appear at all necessary when the work is finished; and as plumbers, as a rule, were never known to even make an attempt at replacing anybody else's work after serving their own convenience, it will become then a very expensive item in the use of wrought-iron pipe, that does not come with the use of cast-iron pipe, to say nothing of the annoyance of explaining the necessity of doing so much cutting to the ever officious boss carpenter or architect, who always make a "royal kick" whenever cutting is to be done.

The next point I wish to consider for a few moments is the difference of support given the water-closets in one system in comparison to that given in the other. To give this a fair explanation I will take you down into the cellar and ask you to accompany me in your mind's eye from the one-quarter bend or soil-pipe ell, according to the kind of pipe you may be using, and get a few common sense facts. It has been claimed by some one, that with wrought-iron pipe a system can be constructed entirely independent of the floors or walls of a building, so that in the event of floors or walls settling the pipe would remain intact. The one-quarter bend or soil-pipe ell, either one, must necessarily have a footing. Usually it is secured on the footings of the wall itself. Now, if one settles the other must follow. But suppose it has a separate foundation, it will be so near that of the foundation itself that if the wall should settle the other must be affected by its settlement. The water-closet being bolted to this by means of flanges free and clear of the floor, would not be affected by such settlement. Let us see how this looks to a practical man, forgetting for a moment the theoretical part of the plumber's trade, of which there is so much and still more to follow.

The closet set on a flange that cannot settle with the building must necessarily rise above the floor when it takes a drop of a few inches over night, if such a thing were possible. The closet tank is always fastened in some manner to the walls of the building; at least I have never yet seen any that were fastened to the soil-pipe, either cast or wrought. The closet bowls and connections being brass and earthenware, do not make a support capable of resisting very much strain, and being connected to the tank with a stiff lead pipe, made more stiff by numerous tags, the plumbers delight (I say delight because they love to throw away valuable time so well that they often put on a lot of

* Paper read before the National Association of Master Plumbers June 26, 1889, by F. J. Beesly, of Kansas City.

tags that are imperatively necessary, according to their own views, that never get a screw put into them or even see the necessity for one). I ask what is to keep the connection to closets from breaking when the tanks settle with the walls and the closets remain intact? If this rigid construction is all that is claimed for it, which I doubt, heavy lead bends and traps, or other suitable closet connections flanged into lead safes and soldered, is the only safe and satisfactory manner of setting closets, to my way of thinking. Even admitting that all buildings do settle more or less, the annoyance of coming just right height to floor levels with wrought-iron pipe is one of the most aggravating things connected with its use, either being $1\frac{1}{2}$ inches too low or $1\frac{3}{4}$ too high, more or less above the floor; and to change either involves taking down a whole length of pipe, sending it away to some power machine to be cut off and rethreaded, stopping further progress of the work until it returns, necessitating a delay of half a day or longer, unless you are prepared with suitable tools to cut and thread four-inch wrought-iron pipe, which would be only half the machinery necessary, as I despair of ever educating the present generation of plumbers to even make the attempt to do this by hand power.

Cast-iron pipe with lead bends have a leeway of several inches, which are taken advantage of in coming to floor levels, making it a simple matter to come to floor lines without trouble.

In the matter of expense as compared with cast-iron pipe of the same size, everything else being considered, I believe it is 30 per cent. more costly, and may be 50 as applied to soil-pipe, extra time and fitting being necessary to complete the work. I have had large and extended experience with the use of wrought-iron pipe for drainage purposes all over this country, and while it is a good thing for the purpose, with the exceptions I have mentioned, and makes a tight and satisfactory job, I wish to say, without prejudice to the use of wrought-iron pipe, that I see no reason to substitute it for cast-iron extra strong pipe and fittings. Standard pipe and fittings should not be used anywhere except for vents above highest fixtures and high water levels.

I will say, in conclusion, that I believe good workmanship, honest manufactured cast-iron soil-pipe tested at factory and again in soil-pipe stack with cold water pressure, is good enough work for anybody or anywhere, less than it would be a dangerous piece of work.

TESTING FOUNDATIONS.

THE following simple method of investigating the ground underlying foundations is given by a correspondent of *London Engineering*: Take a worn-out locomotive boiler flue, and cut slots about $\frac{3}{4} \times 6$ inches in a spiral winding around the flue. Then sharpen one end of the flue to a cutting-edge and put a heavy screw-cap on the other end. This cap should be not less than three inches long and solid for 2 inches of its length. In using the testing apparatus drive the flue down with a heavy sledge at the same time turn the pipe with a large chain-tongs. The pipe can be lifted again by a lever or a derrick of portable form. When the tube is withdrawn the character of the material penetrated can be examined through the slots in the sides. A locomotive boiler-flue is generally about 11 feet long, but this is usually sufficient to test the foundations of light structures.

PLUMBING REGULATIONS.

WE have not at hand a copy of the Toronto plumbing by-law owing to the neglect of the proper authorities to send them out to interested parties, and cannot state to what height the plumbing by-law requires that soil pipes should be carried. We do know that it is generally considered necessary that the soil pipe should be carried high enough to discharge above roof, which should mean the highest portion of any roof on the house, and at some distance from windows. Many soil pipes are carried up no higher than a foot or so above the roof of the addition, and far too often finish just below the sill of an attic window. We saw a soil pipe continued in galvanized iron above the roof which is not according to the by-law. The plumbing inspectors should see that the spirit of the by-law is

carried out in respect to the above, and if they consider it is not sufficiently explicit, they should bring the matter before the proper authorities and have the by-law amended. It is most important that the end of all soil pipes should be extended high enough above the roof to allow of the air discharged being carried into the atmosphere and not at a point where it will lie in a solid body and very possibly overflow into some window. The by-law certainly does not allow of any soil pipe being extended by means of galvanized iron pipe, and that has been done on work completed this year. It may be that the inspectors have far too much work to oversee, but that does not excuse them or those over them if bad work is allowed to be done, while the people are under the impression that all plumbing work is being done in the most approved manner.

An Ottawa despatch says representations have recently been made to Hon. John Carling that in future the control of the local health boards should be assumed by the Dominion Government instead of the Provincial Legislatures, and that the Dominion Government should appoint inspectors of cattle for sanitary purposes.

It is impossible to have too much sunlight or fresh air, says a writer in the *Popular Science Monthly*. Every living room and every sleeping room, when possible, should face the south, and the radiant energy of the sun will be found to induce such a healthful and vigorous physiological action of all the organs of the body, that many doctor's and druggist's bills will be saved, and, in a short time, bring about that greatest blessing of life—a state of good health.

A test for the purity of drinking water is given as follows by Professor Angell of the Michigan University: "Dissolve about half a teaspoonful of the purest white sugar in a pint bottle completely full of the water to be tested, and tightly stopped; expose it to daylight and a temperature up to 70° Fahr. After a day or two examine, holding the bottle against something black, for floating specks, which will betray the presence of organic matter in considerable proportion."

Modern Light and Heat remarks that the value of real estate for offices in crowded cities has been materially enhanced by the introduction of the incandescent light. The dimly lighted rooms on lower floors, constantly increasing in number as daylight is more and more cut off by new buildings that appear to grow a story in height each year, can be readily let when supplied with incandescent light instead of suffocating gas. The time is not far distant when electric lights will be as much a *sine qua non* in all business buildings as the passenger elevator is to-day.

The Vermont Microscopical Association has just announced that a prize of \$250, given by the Wells & Richardson Co., will be paid to the first discover of a new disease germ. The wonderful discovery by Prof. Koch of the cholera germ, as the cause of cholera, stimulated great research throughout the world and it is believed this liberal prize, will greatly assist in the detection of micro-organisms that are the direct cause of disease and death. All who are interested in the subject and the conditions of this prize, should write to C. Smith Boynton, M.D., Sec'y of the Association, Burlington, Vt.

As a result of the opening of the new C. P. R. short line to New Brunswick, Messrs. Emerson & Fisher, manufacturers of slate mantels, at St. John, hope to develop quite an extensive trade with the Western Provinces.

The contract for the supply of sandstone for the three fronts of the new H'y Morgan & Co. dry goods warehouse has been given to W. McNally & Co., Montreal, the quantity required being over 30,000 cubic feet. The stone is coming from the celebrated "Haytor" English red sandstone quarries, and is of a rich brownish red, even texture and fine grain, and promises to make one of the handsomest business buildings in Montreal.

The North American Mining & Cement Manufacturing Co., of Owen Sound, Ont., have made application to the Deputy Commissioner of Patents at Ottawa, to have annulled the patent granted to Fred. Ransome, of Surrey, Eng., in August 1886, for a cement manufacturing machine, on the ground that the machine was not manufactured in Canada within two years after the issue of the patent. The applicants purchased one of these machines, but had no sooner erected it in Canada than Mr. Ransome demanded a royalty of \$1,000. This the company refuses to pay, for the reasons stated

MANUFACTURES AND MATERIALS

THE CANADIAN SLATE INDUSTRY.

OUR article on the slate industry in Canada, which appeared in the CANADIAN ARCHITECT AND BUILDER for June, seems to have awakened considerable interest, judging from correspondence on the subject which we have since received. To persons who may not have read the article in question, we would say that it referred to the complaint of a number of Canadian roofers, that they are placed at a serious disadvantage owing to the refusal or inability of the Rockland Slate Co., of Quebec, to supply them with slate, rendering it necessary to import from the United States subject to an import duty of \$1.00 per square. It was pointed out that the large and rapidly-increasing demand for slate opened the door for profitable competition with the Rockland Co., in its Canadian production; also that at Melbourne, Quebec, there is a quarry of large extent and excellent quality, partially developed which, owing to the death of its owner, can now be purchased at a very moderate figure, and would undoubtedly richly reward a company with the capital and knowledge requisite for its operation.

Believing that by calling attention to what seems to us to be a rare opening for profitable business enterprise, we shall be doing the roofers and slate consumers of Canada a service, as well as assisting the development of the country's industries, we append a few additional particulars which have come into our possession during the present month.

The present protective duty on slate is \$1 per square, instead of 80 cents per square as previously stated. While the present demand is brisk, it would undoubtedly increase many fold if production were stimulated by competition. Owing to the difficulty experienced at present in getting a supply, architects and builders are obliged to specify other roofing materials instead of slate. On this point a member of a Canadian roofing firm recently wrote as follows:

"We have to book our orders with the Company about two months before the slates are required. They had orders for over 6,000 squares on their books on the above date, and more coming in by every mail, with letters simply blackguarding them for the delay in executing former orders. Six thousand squares per month does not represent the actual demand for slate, because we roofers advocate galvanized iron and tin wherever we can, simply because we cannot get slate when required. Architects and builders prefer slates to galvanized iron and tin if they could get them, because they are cheaper and more durable.

At present the slates from the United States are kept out from the Canadian market by a duty of one dollar per square, but if some other companies do not open up new quarries, we slaters will have to petition the Government to take off the duty from slate. The average price of the New Rockland slate on board cars at G. T. R. siding is four dollars and 10 cents per square for No. 1, and \$3.10 per square for No. 2.

You will find enclosed quotations I received last spring from the largest firm of slate manufacturers in the States; their quotations are for sea green slate which is far inferior to the Canadian slate on account of its fading color, yet it cost \$4.71 per square, duty paid, at Sherbrooke, P. Q. Add 25¢ per square freight from Sherbrooke to Richmond, \$4.96 per square, 86 cents per square higher than the New Rockland slate.

Five years ago it cost the New Rockland Co. to produce slate ready for market, \$1.75 per square, and I believe it costs about 10¢ or 15¢ per square less at present. Of course if you ask the Company if they are making money, they will soon tell you they never received a cent dividend from this quarry, but it is likely that a man of business like Geo. A. Drummond, who is president of the Company, and also president of the Board of Trade, Montreal, would invest \$100,000 to build a railway to the quarry after running said quarry 20 years, without a cent dividend? I think I know this Company too well to believe them capable of such folly. I would like to see a Company formed to work the Melbourne quarry. In my opinion it is a far better quarry than the New Rockland. I bought some of the slate they had on hand when Mr. Walton died. I could not wish for better slate. They have better cleavage than the Rockland slate, although both quarries are on the same formation.

\$25,000 or \$30,000 working capital would be plenty to develop the Melbourne quarry, and put it in a shape to turn out two or three thousand squares per month. All the buildings are in good repair. I believe fifteen or eighteen of the houses used to rent for \$6 per month. There are on the premises a very good steam engine and steam pump, both in good order, and a large quantity of tools and rails, etc., in fact almost everything required to commence operations at once.

I am informed by quarrymen who worked for Mr. Walton, that if he had employed practical slate men as managers, that quarry would be a good paying concern to-day, such as New Rockland is."

We understand that slate has been produced at the Melbourne quarry at \$1.75 per square, at which price the contractor is said to have done well. This means \$2 or \$2.25 per square on G. T. R. cars. The New Rockland Company is now charging for No. 1 slate \$4 per square, and for No. 2, \$3 per square, and in addition 40 cents per square freight to the G. T. R. over

their own tramway. This slate band is said to be the best and probably the only valuable one in Canada. One and a half miles of the band runs through the Melbourne property. In the opinion of those familiar with the business, the production of this property should easily be made 1,000 to 2,000 square, in one year, which, at a profit of only \$1 per square, the amount of the protective duty, would net a handsome profit. New Rockland quarry, we are informed, now produces 3,000 squares per month. On the basis of \$1 profit per square, we believe a Company with \$50,000 capital, might reasonably hope to realize the following result from the operation of this property:

Purchase price, say \$25,000; working capital, \$25,000.....	50,000
Interest	3,000
1,000 squares for 6 mos. at \$1 profit.....	\$ 6,000
2,000 " " " " " ".....	12,000
	\$18,000
Less interest on \$50,000 invested.....	3,000
	\$15,000

This result should be worked out owing to the present state of the slate trade and the developed state of the property. We should like to see the right person or persons avail themselves of the opening, reap advantage themselves, and remove the disabilities under which the users of slate in Canada are at present laboring.

CLAY ROOFING-TILE.

IN a recent number of the *Brick, Tile and Metal Review*, we find the following account of the manufacture of roofing-tile as carried on at Akron, Ohio. Ordinary brick clay is used. "The grinding and tempering is done in tracers, such as used for sewer pipe. When tempered, whatever is put into the cylinder is forced out at the end of the stroke in a series of parallel plates, about 6 inches wide by $\frac{3}{8}$ inch thick, and extending along until cut up in lengths. Considerable oil is used to keep the clay smooth and to keep the freshly pressed plates from sticking. These plates are adjusted one after another, on a series of disks arranged on the circumference of a circular revolving disk. This disk moves through one-sixth of its circumference at a stroke, boring in succession each plate of clay spread out on its table under a compound piston. This piston is arranged to cut off the edge of the plate in a symmetrical shape, and then to press it into the required shape. The pressed tiles are removed and set in piles to dry. Drying takes about two weeks in a steam-heated chamber, as the oil used in the pressing of the clay hinders the escape of the water. They are finally piled in loose order in a kiln to a depth of about 6 feet, and subjected to a light burn. The kilns employed are circular downdrafts. The ware is of several classes. Shingle tile, which are more like shingles than anything else, are slabs of burnt clay 12 x 6 inches x $\frac{3}{8}$ inch, with holes in proper places for nailing them to the roof. Their uses are as nearly like those of a real shingle as well can be. About five inches of each tile are exposed to the weather. The so-called 'diamond-tile' are made to hook into each other, but are also supplemented by nails. They are more ornamental than the shingle tiles, but as they are more dependent on each other for support, they are not so durable or strong. One of the chief objections to a tile roof is its weight; a 10-foot square of plain shingle-tile weighs about 1,100 pounds, and the same area of diamond tile weighs from 650 to 850 pounds. The advantages claimed for them are durability, beauty, and immunity from danger by fire or lightning."

THE EFFECT OF FROST ON STONE.

THE principal danger of exfoliation arises from the expansion of the moisture contained in the stone under the influence of frost, says Mr. G. R. Burnell in a recent issue of one of our foreign exchanges, and a very excellent process was invented by M. Brard for the purpose of ascertaining the probable extent due to this cause. M. Brard, in his experiments upon the resistance of stones, caused them to be boiled for half an hour in a saturated solution of the sulphate of soda. They were then withdrawn and allowed to stand in a flat vessel, at the bottom of which was a small quantity of the same solution, the first efflorescences were washed off, and the degradation of the stones during the next five or six days, under the effect of the continued efflorescence, was taken as an indication of the probable extent to which they would be affected by frost. In the first volume of Rondelet's "Art de Bâtir," page 307 (edition 1842, Paris), M. Brard's process is described in detail; but some very curious experiments recorded in Vol. 7, "Ire serie des Annales des Ponts et Chaussées," by M. Minard, together with an article by M. Vicat, inserted in the same volume, throw very considerable doubts upon the exact amount of dependence to be placed on its indications. M. Vicat, indeed, very properly observes that it still remains to be proved that the expansive action of water in freezing is identical with that of crystallization, which can only produce energetic effect at temperatures between 68° and 86° F. According to this very accurate observer, stones which are exposed to a southerly aspect, on the north of the equator, are more affected by frost than those exposed to the north; and the most efficient protection to materials of this description of a porous nature is a coating of oil paint or any other fatty pigment which prevents moisture from being driven or absorbed into the stone. M. Minard recommends that stone be quarried in the spring, and not employed in a building until it has been exposed to the effect of one winter.



CONTRACTS AWARDED.

Mr. W. Harris, of Barrie, has the contract for the alterations to the Bradford High School.

CLINTON, ONT.—Mr S. S. Cooper, has been awarded the contract for the new Baptist church.

COLLINGWOOD, ONT.—Messrs. Kerr Bros. of Walkerville, have received the contract for the new system of waterworks.

PARRY SOUND, ONT.—The contract for the erection of the new Court House has been awarded to Mr. George Ball, of Barrie.

ALMONTE, Ont.—The contract for the new Post Office building has been given to Mr. R. Cameron, who is to build it of stone for \$13,395.

Mr. John Stewart, of Hamilton, has been given the contract to construct the superstructure of steel iron and timber of the new King st. Subway, at the price of \$84,666.

SARNIA, ONT.—The contract for building the new high school has been given to Andrew Lockhart, for \$19,000. The cost of the building when completed will be \$25,000.

VANCOUVER, B. C.—Mr. Tompkins, C. P. R. contractor, has instructions to rebuild the front of the Durham block, and will also proceed with the erection of the Sir Donald Smith block on Granville street.

TORONTO, ONT.—The city Council has given the contract for 4,600 feet of 48-inch steel pipe to the Peterboro' Bridge Co., at \$7.06 per foot; for 6,000 feet of 60 inch steel pipe to John Abell, Toronto, at \$9.89 per foot.

CONTRACTS OPEN.

LUCKNOW, ONT.—A system of waterworks is to be put in.

BERLIN, ONT.—A sewerage system to cost \$30,000 will be put in.

PRESTON, ONT.—It is proposed to erect a large summer hotel here.

STRATFORD, ONT.—Tenders have been called for the new hospital.

MIAMI, MAN.—Mr. Cowan of Headingly is about to erect a \$2,000 hotel.

GALT, ONT.—Knox church will build a new school room to cost \$10,000.

QUEBEC.—Plans are being prepared for the re-building of the Hotel Dieu.

SARNIA, ONT.—Lambton County Council has decided to erect a house of refuge.

ORILLIA, ONT.—A hospital to be built by a joint stock company is spoken of.

PORTAGE LA PRAIRIE.—The site for the new Lansdowne college has been secured.

BRANDON, MAN.—Plans are being prepared for an addition to the Presbyterian church.

PERTH, ONT.—The advisability of adopting a system of water works and sewerage is being considered.

ASHBURNHAM, ONT.—The sum of \$4,500 has been appropriated for the erection of a new town hall.

KEEWATIN, ONT.—It is reported on good authority that the C. P. R. will erect a new iron bridge soon.

BRIDGEWATER, ONT.—The Methodist congregation will rebuild their church, recently destroyed by fire.

GUELPH, ONT.—Mr. James Goldie will erect a new residence. The material will be Credit Valley stone.

BRANTFORD, ONT.—Orders have been given by the Militia authorities to have the plans for a new drill shed prepared.

MITCHELL, ONT.—The sum of \$4,000 has been voted for improvements to the electric light and water works systems.

GALT, ONT.—Messrs. Goldie & McCulloch have offered a free site for a hospital provided the building is commenced at once.

WINNIPEG, MAN.—Messrs. Ashdown, Whitla and Chown have each subscribed \$1,000 towards the erection of a new Wesleyan college.

SMITH'S FALLS, ONT.—The Public School Board have purchased a site on which they propose to erect at once a new school building.

ST. THOMAS, ONT.—A joint stock company has been formed with a capital of \$10,000 to construct a new Opera House on the corner of George and Talbot streets.

PORT HOPE, ONT.—A special Committee has recommended the Town Council to issue debentures to the amount of \$20,000 for the construction of a new water-works system.

NEW WESTMINSTER, B. C.—It has been decided to secure a supply of water for the city from Coquitlam Lake. The necessary works are expected to cost \$400,000, and are to be constructed under the control of a Commission.

OWEN SOUND, ONT.—A site has been purchased for a new Methodist church here and operations will be begun at once.—Mr. J. C. Forster, architect, is preparing plans for a stone Sunday School for St. George's Church, which is estimated to cost \$5,000.

TORONTO, ONT.—The following building permits have been issued from the office of the City Commissioner since last issue: P. H. Drayton, alterations to residence, 127 Bloor street, cost \$1,000; Mrs. Cornish, 2 story brick dwelling, College street, cost \$1,000; J. H. Lennox, pair 2 story r. c. dwellings, Ontario street, cost \$2,400; John Newell, 2 story r. c. dwelling, Duke street, near Ontario, cost \$1,400; Darling & Curry, hospital for sick children, College Ave., cost \$7,500; Mrs. Mary McCarron, 3 story brick addition, to hotel, corner Queen and Victoria, cost \$8,000; L. Sievert, 2 story brick dwelling, Terauley street, cost \$1,200; Toronto Real Estate Co., alterations to 384 Yonge street, cost \$4,000; T. H. Dallmadge, brick addition, King street west, cost \$3,000; J. Reid, 2 story brick dwelling, Sussex Ave., cost \$3,000; E. Carveth, 2 story brick dwelling, Markham street, \$3,000; John Munro, 2 story and attic dwelling, Orde street, \$7,000; John Low, three 3-story stores, Spadina Ave., cost \$7,500; John Dancy, alterations, Church street, cost \$1,000; Fleming Estate, three 3-story brick stores, Elm street, cost \$11,000; F. Breen, 2-story brick addition, St. George street, cost \$2,000; T. Baylis, 2-story and attic brick dwelling, Elizabeth street, \$4,500; H. Davis, 3-story brick store, Queen street west, cost \$30,000; G. M. Hunter, 2-story and attic brick dwelling, Willcox street, cost \$3,000, and 2-story brick dwelling, Classic Ave., cost \$5,500; J. V. Hunter, 2-story and attic dwelling, Classic Ave., cost \$2,800; W. S. Thompson, additions to two stores, York street, cost \$8,000; Wm. Davies, 2-story brick dwelling, Jarvis street, cost \$11,000; J. W. Gray, 2-story brick addition, Murray street, cost \$1,000; Jackson Estate, 2-story warehouse, Bay street, cost \$8,000.

Ex-Mayor McClay of Mitchell, Ont., will remove his planing mill and sash and door factory to Woodstock.

Messrs. C. B. Wright & Sons, Hull, Que., have completed their new factory for the manufacture of Portland cement.

The Globe furniture Co. of Walkerville, Ont., has applied for incorporation, with a capital of \$50,000, for the purpose of manufacturing church, school and hall furniture.

The Canada Galvanizing and Steel Roofing Company, of Montreal, has been incorporated with \$50,000 capital stock, for the purpose of manufacturing galvanized steel, metal roofing and general metal working.

The value of the building stone produced in the United States in 1888 is \$25,000,000, or \$500,000 more than in the preceding year. Brick and tile were manufactured to the value of \$48,213,000—a small gain over 1887.

Granite quarries have recently been opened near Lakefield, Ont., and on an island called Eagle Mount in Stoney Lake, by Messrs. Murray & Fraser, of Toronto. The latter quarry will be operated only in summer, the product being shipped by water.

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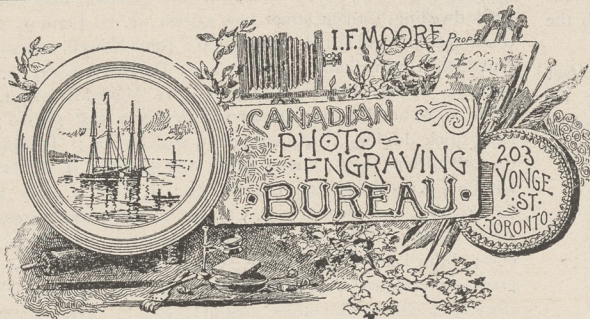
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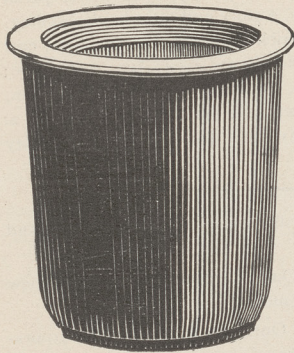
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[Advertisement.]

HEATING AND VENTILATION OF SCHOOLS.

THE following is taken from the Toronto Globe of June 21, and is from a report of the proceedings of the Toronto Public School Board of the evening before:

SMEAD-DOWD HEATING SYSTEM.

On the desks of the members were printed copies of the report of the deputation appointed by the Board at its meeting held March 6, 1889, to visit some of the principal cities of the United States with a view to gathering such information as would be helpful in the better construction, heating and ventilation of school buildings, and for the better arrangement and management of the schools. The report says the Committee visited the following cities in the order named: Detroit, Toledo, Cleveland, Pittsburg, Allegheny City, Cincinnati, Washington, Baltimore, Philadelphia, New York, Brooklyn, Jersey City, Albany, Troy, Utica, Syracuse, Rochester, Buffalo, in the United States, and Hamilton, Canada.

The Committee, on reaching a city, sought out the officers of the Board of Public Instruction, and from them learned the location of six or eight of those they considered their best school buildings in point of construction, and the most perfect as to heating and ventilation.

Heating and ventilation, as perhaps the most important part of school construction, received most careful attention. Particular inquiries were made in this regard of the schools visited. The Committee asked what system of heating was in use, with a view to ascertaining how evenly the heat was distributed throughout the whole area of a class room, and how often the atmosphere was changed during a school session of an hour and a half. They took down the reading of the thermometer at the floor, ceiling, and midway between, and also measured with the anemometer the volume and velocity of the warm and fresh air at the intake, when there was any, and the foul air at the outlet.

The report of the Committee is comprehensive and takes in every part of school construction and management, and naturally considerable attention is paid in the report to heating and ventilation as follows:

To gather information under this head, your Committee gave its very best attention, making careful examination and tests of the various systems. We found nearly all the cities in the same position, having a few years ago in a number of the schools substituted steam for stoves, while now they are substituting the Smead system for steam, New York and Brooklyn being the exceptions. Though these cities pride themselves in having (with their present mode of using steam apparatus) the best heated and ventilated schools on the continent, the result of our examination proved quite the reverse

for of all the steam-heated schools visited we found the Queen Victoria School, Hamilton, Canada, the No. 10 school, Buffalo, and the Irving Avenue School, Detroit, by far the best. These are placed in their order of merit. Two of these schools are in some respects as well heated and ventilated as some of our own under the Smead-Dowd system, yet in no respect are they superior, and their cost was fully twice that of the latter system.

In both Hamilton and Detroit they are now using the Smead system in preference to steam.

The principal defect from a sanitary point of view in all the steam-heated school buildings we visited is in regard to the fresh air supply, which is entirely insufficient.

The method adopted for this purpose is to admit the air through perforated plates placed beneath the sills of windows in each room. Having passed through this plate, the air is supposed to go downwards through a narrow passage in the wall, and to enter the room at a level with the floor and then pass up through a steam radiator which is placed against the window. The sum of the area of the clear opening in the external plate of each window is from 22 to 25 square inches, so that the area of clear opening for the supply of pure air to the room is from 80 to 10 square inches, giving an average of about two-thirds of a square foot to each room. When it is remembered that this is intended to supply fresh air for 60 children, each of whom should have as a minimum 20 cubic feet of air per minute, it will be seen that it is simply impossible to obtain such a supply through the opening provided, which in fact, will hardly furnish 5 cubic feet per minute, for each pupil. In most of the rooms at the time we visited them, a large number of the fresh air openings were found closed, and even when opened in the majority of cases very little air was entering them. In very cold weather, when they are specially needed, they are kept closed, in order to prevent the freezing of the condensed water in the radiator and to avoid draughts upon the children sitting near them. The greater part of the supply of air for the school rooms in cold weather, comes directly through the walls, especially on the windward side of the building, and from halls, the doors and transoms, which from the several rooms are usually kept open. Examination showed that in most cases a strong current existed in the lower part of the open doorways. In but very few of the schools was there any provision for diminishing the incoming air without cutting off the supply of heat, and when the rooms become overheated, as appears to be not unfrequently the case, the only method of cooling is to shut off the heat and open the windows, thus creating draughts.

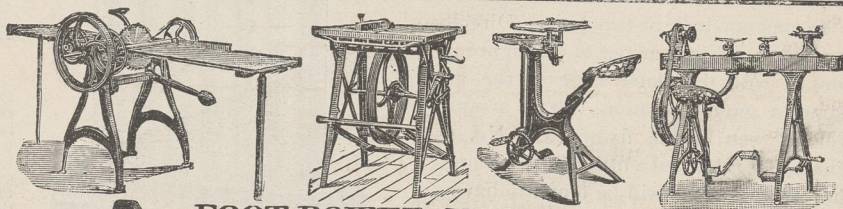
Our examination of the school buildings heated by steam showed them to be almost all in a very unsatisfactory condition. In those that made any pretensions

to have a system of ventilation, the provision made was mainly for the removal of foul air. Sufficient attention was not given to the amount and location of the fresh air supply.

Your Committee are unanimous in the opinion that in no one of all the schools visited did we find a system of heating and ventilation superior to the Smead,

Dowd & Co.'s, such as we have in our recently built schools, nor one equal to it in the facilities for the admission of large volumes of fresh air.

Since the return of the deputation from the United States the Toronto School Board have awarded Smead, Dowd & Co. contracts for placing their system complete in fifteen buildings and additions to buildings.



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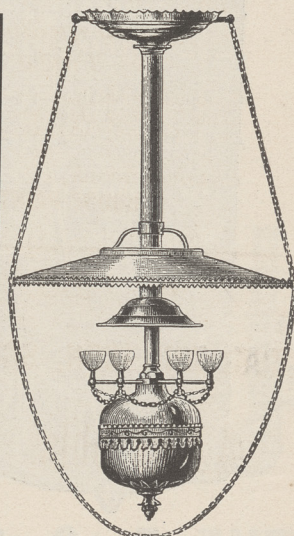
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 "A simple and easily applied test for wall-paper has been devised by Mr. F. F. Grensted. No apparatus is needed beyond an ordinary gas jet, which is turned down to quite a point, until the flame is wholly blue. When this has been done, a strip of the paper suspected to contain arsenic is cut one-sixteenth of an inch wide and an inch or two long. Directly the edge of this paper is brought into contact with the outer edge of the gas flame, a gray coloration, due to arsenic, will be seen in the flame (test No. 1). The paper is burned a little, and the fumes that are given off will be found to have a strong garlic-like odor, due to the vapor of arsenic acid (test No. 2).

"Take the paper away from the flame, and look at the charred end ; the carbon will be colored a bronze red. This is a copper reduced by the carbon (test No. 3). Being now away from the flame, in a fine state of division, the copper is slightly oxidized by the air, and on placing the charred end, a second time, not too far into the flame, the flame will now be colored green by copper (test No. 4). By this simple means it is possible to form an opinion, without apparatus, and without leaving the room, as to whether any wall-paper contains arsenic ; for copper arseniate is commonly used in preparing wall-papers. The first and second tests would be yielded by any paper containing arsenic in considerable quantities."

Yellow gold lacquer is the best varnish for gilded work.

For a paint to be used on metallic surfaces to be gilded, use a metallic paint in boiled oil. After it becomes thoroughly dry rub smooth before gilding.

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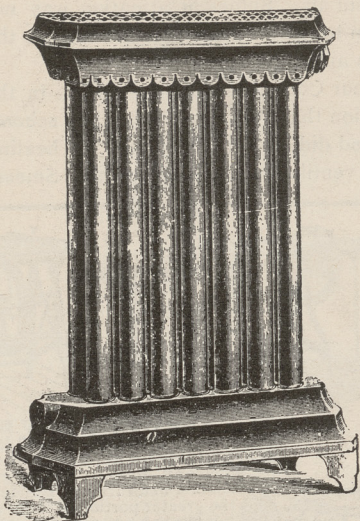
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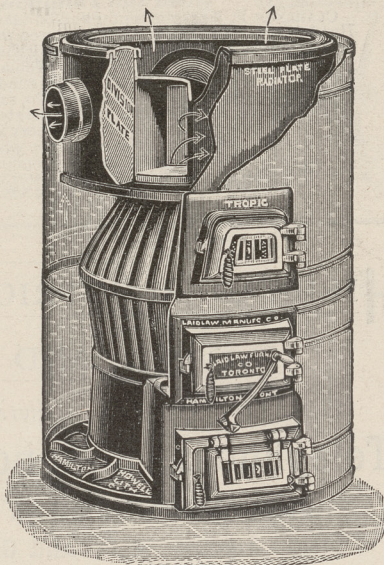
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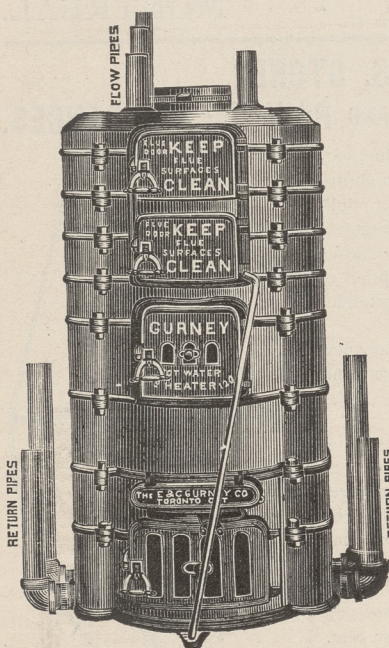
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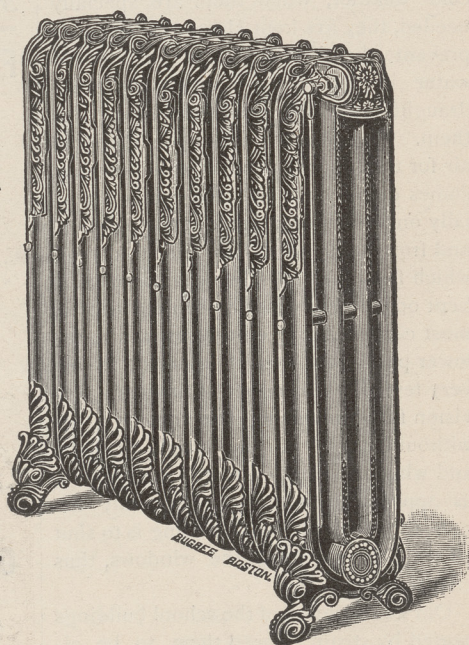
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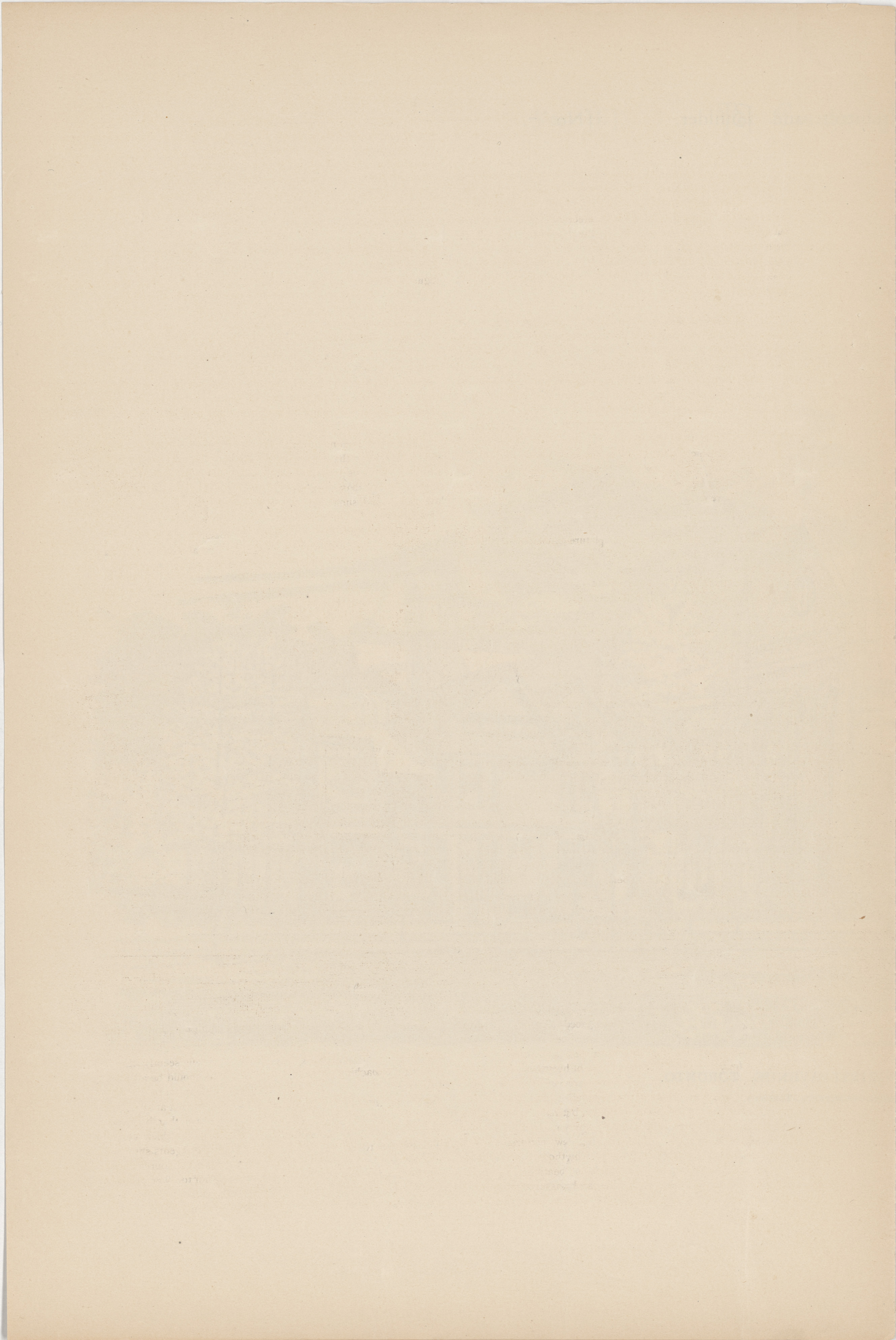
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